Resilient retainer for vibration senstive components

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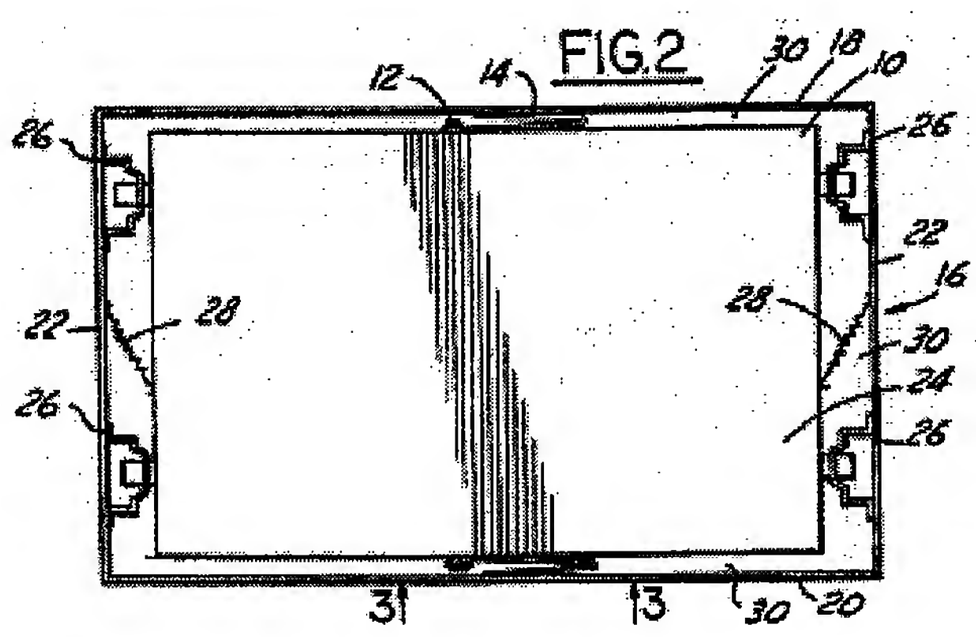
Abstract of **EP0734903**

A vibration sensitive component (10) is mounted within a housing (16). The mass of the housing (16) is supported by a damper (26) which absorbs a portion of the shock to the component (10). In addition, a low profile resilient retainer (14) provides a centring force to keep the component (10) from contacting the housing (16).



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(54) Resilient retainer for vibration senstive components

Elastische Haltevorrichtung für vibrationsempfindliche Komponenten

Dispositif élastique de maintien d'éléments sensibles aux vibrations

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- **PATENT ABSTRACTS OF JAPAN vol. 16, no. 125 (P-1331), 30 March 1992 & JP-A-03 290892 (TOSHIBA CORP.), 20 December 1991,**

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Description

[0001] The present invention relates generally to a mounting for vibration sensitive components. More specifically, the invention relates to mounting a vibration sensitive component in an automotive vehicle to prevent side-to-side motion.

[0002] Electronic data storage components, such as CD players and navigation systems, and other vibration sensitive components when used in harsh vibrational environments typically require vibration isolation in their mounting systems. Typically, a combination of energy storage elements such as springs are used in combination with energy dissipative elements such as dampers to support the mass of the component.

[0003] In automotive applications, electronic components are mounted within a housing which is mounted within the automobile. One goal of an automotive component designer is to minimise the overall package size of the component to conserve weight and simplify packaging. Examples of electronic data storage components include compact disc players and navigation systems. In one known method of mounting a compact disc player, several helical extension springs on the top and bottom and/or ends of the component are used to suspend the component so that it is vibrationally isolated from the housing into which the component is mounted to allow the optical pickup to accurately track the recorded information. The helical springs however allow the component to have some side-to-side motion. When a compact disc player moves in a side-to side motion, there is a potential for the compact disc player to contact the housing causing a skip. Preventing a skip is an important design requirement when mounting a compact disc player.

[0004] Some methods of mounting a sensitive electronic device to prevent side-to-side movement includes employing additional helical springs and foam padding. However, these methods typically take a relatively large amount of space, which is typically not desirable in an automotive system.

[0005] It would therefore be desirable to mount a vibration sensitive component so that side-to-side motion is reduced to prevent the component from contacting the housing using a mechanism that occupies a minimal space.

[0006] The specification of EP-A-0 643 392 on which the preamble of claim 1 is based, describes recording and reproducing apparatus which employs a disc recording medium and has a recording and reproducing unit which is supported in a floating state on a base member via damper units and spring plate members. A closure member is rotatably mounted to cover the recording and reproducing unit. The spring plates are mounted on the closure member so that, in the closed position of the closure member, the recording and reproducing unit is held in a position where the weight of the unit, the upward force of the damper units and the elastic downward force of the spring plates counterbalance one another.

[0007] The document JP-A-3290892 describes a disk reproducing device which has an outer frame incorporating semispherical contacts on which synthetic resin plates support a reproducing mechanism. The mechanism is protected against impact by the point contact and vibration proof plates.

[0008] The object of the present invention is to provide a cost effective resilient retainer in a reduced package space for mountings typically used in vibration reduction.

[0009] The present invention includes a housing for a component having a top portion, a bottom portion and a pair of side walls extending therebetween. A vibration sensitive component is positioned within the housing and has a top, a bottom and a pair of side walls extending therebetween. The vibration sensitive component has at least one mounting pin extending from its bottom. An attachment means mounts the vibration sensitive component within the housing so that a space is formed between the bottom of the vibration sensitive component and the bottom of the housing. A resilient retainer isolates the vibration sensitive component from the side walls. The resilient retainer includes a connection portion for fixedly attaching to at least one mounting pin, and a pair of biasing elements, each of which is mounted between the connection portion and the side walls in the space between the bottom of the vibration sensitive component and the bottom of the housing. The biasing elements each have angularly disposed elements exerting a predetermined centring force between the side wall and the mounting pin.

[0010] The invention will now be described further, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view of a vibration sensitive component having a resilient retainer according to the present invention;

FIG. 2 is a cutaway side view of a vibration sensitive component mounted within a housing according to the present invention;

FIG. 3 is a bottom view of a vibration sensitive component mounted within a housing;

FIG. 4 is a cross sectional view of mounting for a resilient retainer according to the present invention; and

FIG. 5 is an enlarged cutaway view of a resilient retainer according to the present invention.

[0011] Referring to FIG. 1, a vibration sensitive component 10 such as a compact disc player, on-board navigation system, or other data storage component has a plurality of pins 12 fixedly attached thereto. Pins 12 secure resilient retainer 14 to component 10. Pins 12 are preferably centred on component 10

[0012] Referring now to FIGS. 2 and 3, component 10

is mounted within a housing 16. Housing 16 has a top wall 18, a bottom wall 20, two end walls 22 and two side walls 24 (only one of which is shown in FIG. 2).

[0013] An energy dissipative device such as damper 26 and a energy storage device such as helical spring 28 are used to support the mass of component 10 within housing 16 so that a space 30 is formed between component 10 and housing 16.

[0014] Resilient retainer 14 is mounted on component to prevent component from contacting housing 16. Resilient retainer 14 may be mounted between any wall of component 10 and any wall of housing 16. Several locations may also be used in combination. For example, a resilient retainer 14 may be mounted on the top of component and the bottom of the component.

[0015] As is best seen in FIG. 3, a mounting portion 32 is formed near the centre of resilient retainer 14. Mounting portion is formed to be secured to at least one pin 12 and preferably two pins 12. Two V-shaped portions 34 extend downwardly and outwardly from mounting portion 32 in combination generally form a "W"-shaped member. Preferably, V-shaped portions 34 are symmetrical and are used to bias component 10 away from its adjacent wall. Each V-shaped portion 34 has a fulcrum 36 at the vertex of the "V". From each fulcrum 36, a free end 38 extends. Each free end 38 freely engages side wall 24 to prevent side-to-side movement of component 10. Free end 38 may also have a curved portion 40 near its tip. Sometimes it desirable to allow free end 38 to move in relation to side wall 24. Curved portion 40 helps the tip of free end 38 move relative to side wall 24.

[0016] Resilient retainer 14 is preferably formed of a single piece of resilient and ductile material such an ASTM music wire type A228 having a diameter of 1.0mm. In the present example a piece of wire 94 mm long is used. However, the length can vary depending on the application. As an alternative to letting free ends 38 freely engage side walls, a hold down 42 can be used to retain free end 38 in a fixed relationship to side wall 24. Such a configuration is useful when less freedom in the movement of component 10 is required.

[0017] Referring now to FIG. 4, pins 12 are securely connected to component 10. A notched portion 44 preferably integrally formed into pin 12 is used to engage resilient retainer 14.

[0018] Referring now to FIG. 5, in the present invention, an undeformed resilient retainer 14 as a vertical distance d between the tip of free end 38 and mounting portion 32 of about 12 mm. The overall width of retainer 14 undeformed is about 74 mm. When resilient retainer 14 is placed within housing 16, it conforms to the dimensions of housing 16 and provides a centring force.

Claims

1. A vibration sensitive assembly comprising:

a housing (16) having a top portion (18), a bottom portion (20) and a pair of side walls (24) extending therebetween;

a vibration sensitive component (10) positioned within said housing (16), said vibration sensitive component having a top, a bottom and a pair of side walls extending therebetween,

attachment means (26) mounting said vibration sensitive component (10) within the housing (16) so that a space (30) is formed between said bottom of said vibration sensitive component (10) and the bottom of the housing (16); and

a resilient retainer (14) isolating said vibration component (10) from said housing (16);

characterised in that;

the bottom of the vibration sensitive component has a mounting pin (12) extending outwardly therefrom;

the resilient retainer (14) includes a connection portion (32) fixedly attached to the mounting pin (12) and a pair of biassing elements (34) mounted between the connection portion (32) and said side walls in the space (30) between the bottom of the vibration sensitive component (10) and the bottom of the housing (16); and

the biassing elements (34) are angularly disposed to exert a predetermined centring force between said side walls and said mounting pin (12).

2. A vibration sensitive assembly as claimed in claim 1, wherein each of said biassing elements (34) is mounted between one of the side walls (24) and the bottom of the vibration sensitive component (10).

3. A vibration sensitive assembly as claimed in claim 2, wherein each of said biassing elements (34) is fixedly secured between one of said side walls (24) and said bottom.

4. A vibration sensitive assembly as claimed in any one of claims 1 to 3, wherein said vibration sensitive component (10) comprises a compact disc player.

5. A vibration sensitive assembly as claimed in any one of the preceding claims, wherein said resilient retainer (14) is formed of a unitary structure.

6. A vibration sensitive assembly as claimed in any one of the preceding claims, wherein said vibration sensitive component (10) has two mounting pins (12) centred on its width.

7. A vibration sensitive assembly as claimed in any one of the preceding claims further comprising a second resilient retainer (14) mounted between the

top of the housing (16) and the top of the vibration sensitive component (10).

8. A vibration sensitive assembly as claimed in any one of claims 1 to 6, further comprising a second resilient retainer (14) mounted between one of the walls of the housing (16) and the top of the vibration sensitive component (10).

9. A vibration sensitive assembly as claimed in any one of claims 1 to 6, further comprising second and third resilient retainers (14) mounted between the walls of the housing (16) and the top of the vibration sensitive assembly (10).

10. A vibration sensitive assembly as claimed in any one of the preceding claims, wherein the or each resilient retainer (14) comprises a generally w-shaped member.

11. A vibration sensitive assembly as claimed in claim 10, wherein the w-shaped member of the or each resilient retainer (14) has turn back spring arms (34) splayed downwardly and outwardly from said connection portion (32) terminating at a free end (38), said free end (38) engaging said side wall.

Patentansprüche

1. Erschütterungsempfindliche Einheit, folgendes aufweisend:

ein Gehäuse (16) mit einem Oberteil (18), einem Bodenteil (20) und Zwei sich Zwischen diesen erstreckenden Seitenwänden (24);
ein erschütterungsempfindliches Bauteil (10), welches in besagtem Gehäuse (16) angeordnet ist, wobei besagtes erschütterungsempfindliches Bauteil ein Oberteil, ein Bodenteil und zwei sich zwischen diesen beiden erstrekkende Seitenwände aufweist;
Befestigungsmittel (26), welche besagtes erschütterungsempfindliche Bauteil (10) in besagtem Gehäuse (16) lagern, so daß zwischen besagtem Boden des besagten erschütterungsempfindlichen Bauteiles (10) und dem Boden des Gehäuses (16) ein Raum gebildet wird; und
eine federnde Halteklammer (14), welche besagtes erschütterungsempfindliches Bauteil (10) gegenüber besagtem Gehäuse isoliert;
dadurch gekennzeichnet, daß
der Boden des erschütterungsempfindlichen Bauteiles einen von diesem nach außen abstehenden Lagerzapfen (12) aufweist;
die federnde Halteklammer (14) einen fest mit dem Lagerzapfen (12) verbundenen Verbindungsabschnitt (32) aufweist, sowie zwei Spannelemente (34), welche Zwischen dem Verbindungsteil (32) und besagten Seitenwänden im Raum (30) zwischen dem Boden des erschütterungsempfindlichen Bauteiles (10) und dem Boden des Gehäuses (16) eingebaut sind; und daß
die Spannelemente (34) abgewinkelt ausgebildet sind, so daß sie eine vorgegebene Zentrierkraft zwischen besagten Seitenwänden und besagtem Lagerzapfen (12) ausüben.

2. Erschütterungsempfindliche Einheit nach Anspruch 1, worin jedes der besagten Spannelemente (34) zwischen einer der Seitenwände (24) und dem Boden des erschütterungsempfindlichen Bauteiles (10) eingebaut ist.

3. Erschütterungsempfindliche Einheit nach Anspruch 2, worin jedes der besagten Spannelemente (34) fest zwischen einer der Seitenwände (24) und besagtem Boden befestigt ist.

4. Erschütterungsempfindliche Einheit nach einem beliebigen der Ansprüche 1 bis 3, worin besagtes erschütterungsempfindliches Bauteil (10) von einem Compact-Disc-Spieler gebildet wird.

5. Erschütterungsempfindliche Einheit nach einem beliebigen der vorangehenden Ansprüche, worin besagte federnde Halteklammer (14) als einteiliges Gebilde geformt ist.

6. Erschütterungsempfindliche Einheit nach einem beliebigen der vorangehenden Ansprüche, worin besagtes erschütterungsempfindliches Bauteil (10) zwei Lagerzapfen (12) aufweist, die in seiner Breite zentriert sind.

7. Erschütterungsempfindliche Einheit nach einem beliebigen der vorangehenden Ansprüche, außerdem eine zweite federnde Halteklammer (14) aufweisend, welche zwischen dem Oberteil des Gehäuses (16) und dem Oberteil des erschütterungsemfindlichen Bauteiles (10) eingebaut ist.

8. Erschütterungsempfindliche Einheit nach einem beliebigen der Ansprüche 1 bis 6, außerdem eine zweite federnde Halteklammer (14) aufweisend, welche zwischen einer der Wände des Gehäuses (16) und dem Oberteil des erschütterungsempfindlichen Bauteiles (10) angebracht ist.

9. Erschütterungsempfindliche Einheit nach einem beliebigen der Ansprüche 1 bis 6, außerdem Zweite und dritte federnde Halteklammern (14) aufweisend, welche zwischen den Wänden des Gehäuses (16) und dem Oberteil des erschütterungsempfindlichen Bauteiles (10) ange-

bracht sind.

10. Erschütterungsempfindliche Einheit nach einem beliebigen der vorangehenden Ansprüche, worin die bzw. jede federnde Halteklammer (14) ein allgemein W-förmig ausgebildetes Glied aufweist.

11. Erschütterungsempfindliche Einheit nach Anspruch 10, worin das W-förmige Glied jeder federnden Halteklammer (14) zurückgebogene Federarme (34) aufweist, welche nach unten und nach außen von besagtem Verbindungsabschnitt (32) abgewinkelt sind und in einem freien Ende (38) auslaufen, wobei besagtes freies Ende (38) an besagter Seitenwand anliegt.

Revendications

1. Unité sensible aux vibrations, comprenant :

   - un logement (16) présentant une portion supérieure (18), une portion inférieure (20) et une paire de parois latérales (24) s'étendant entre celles-ci ;
   - un composant sensible aux vibrations (10) placé à l'intérieur dudit logement (16), ledit composant sensible aux vibrations présentant une partie supérieure, une partie inférieure et une paire de parois latérales s'étendant entre celles-ci ;
   - des moyens de fixation (26) montant ledit composant sensible aux vibrations (10) à l'intérieur dudit logement (16) de sorte qu'un espace (30) est formé entre ladite partie inférieure dudit composant sensible aux vibrations (10) et la partie inférieure du logement (16) ; et
   - un dispositif de retenue résilient (14) isolant ledit composant sensible aux vibrations (10) dudit logement (16) ;

   caractérisée en ce que
   - la partie inférieure du composant sensible aux vibrations présente une cheville de montage (12) s'étendant vers l'extérieur depuis celui-ci ;
   - le dispositif de retenue résilient (14) inclut une portion de connexion (32) fixée de manière inamovible à la cheville de montage (12) et une paire d'éléments d'inclinaison (34) montés entre la portion de connexion (32) et lesdites parois latérales dans l'espace (30) entre la partie inférieure du composant sensible aux vibrations (10) et la partie inférieure du logement (16) ; et
   - les éléments d'inclinaison (34) sont disposés de manière angulaire pour exercer une force de centrage prédéterminée entre lesdites parois latérales et ladite cheville de montage (12).

2. Unité sensible aux vibrations selon la revendication 1, dans laquelle chacun desdits éléments d'inclinaison (34) est monté entre l'une desdites parois latérales (24) et la partie inférieure dudit composant sensible aux vibrations (10).

3. Unité sensible aux vibrations selon la revendication 1, dans laquelle chacun desdits éléments d'inclinaison (34) est fixé de manière inamovible entre l'une desdites parois latérales (24) et ladite partie inférieure.

4. Unité sensible aux vibrations selon l'une des revendications 1 à 3, dans laquelle ledit composant sensible aux vibrations (10) comprend un lecteur de disque compact.

5. Unité sensible aux vibrations selon l'une des revendications précédentes, dans laquelle ledit dispositif de retenue résilient (14) est formé d'une structure unitaire.

6. Unité sensible aux vibrations selon l'une des revendications précédentes, dans laquelle ledit composant sensible aux vibrations (10) présente deux chevilles de montage (12) centrées sur sa largeur.

7. Unité sensible aux vibrations selon l'une des revendications précédentes, comprenant également un second dispositif de retenue résilient (14) monté entre la partie supérieure du logement (16) et la partie supérieure du composant sensible aux vibrations (10).

8. Unité sensible aux vibrations selon l'une des revendications 1 à 6, comprenant également un second dispositif de retenue résilient (14) monté entre l'une des parois du logement (16) et la partie supérieure du composant sensible aux vibrations (10).

9. Unité sensible aux vibrations selon l'une des revendications 1 à 6, comprenant également un second et un troisième dispositifs de retenue résilients(14) montés entre les parois du logement (16) et la partie supérieure du composant sensible aux vibrations (10).

10. Unité sensible aux vibrations selon l'une des revendications précédentes, dans laquelle le ou chaque dispositif de retenue résilient (14) comprend un élément généralement en forme de W.

11. Unité sensible aux vibrations selon la revendication 10, dans laquelle l'élément en forme de W du ou de chaque dispositif de retenue résilient (14) présente des bras à ressort inverse (34) s'évasant vers le bas et vers l'extérieur depuis ladite portion de connexion (32) se terminant en une extrémité libre

(38), ladite extrémité libre (38) s'engageant avec ladite paroi latérale.

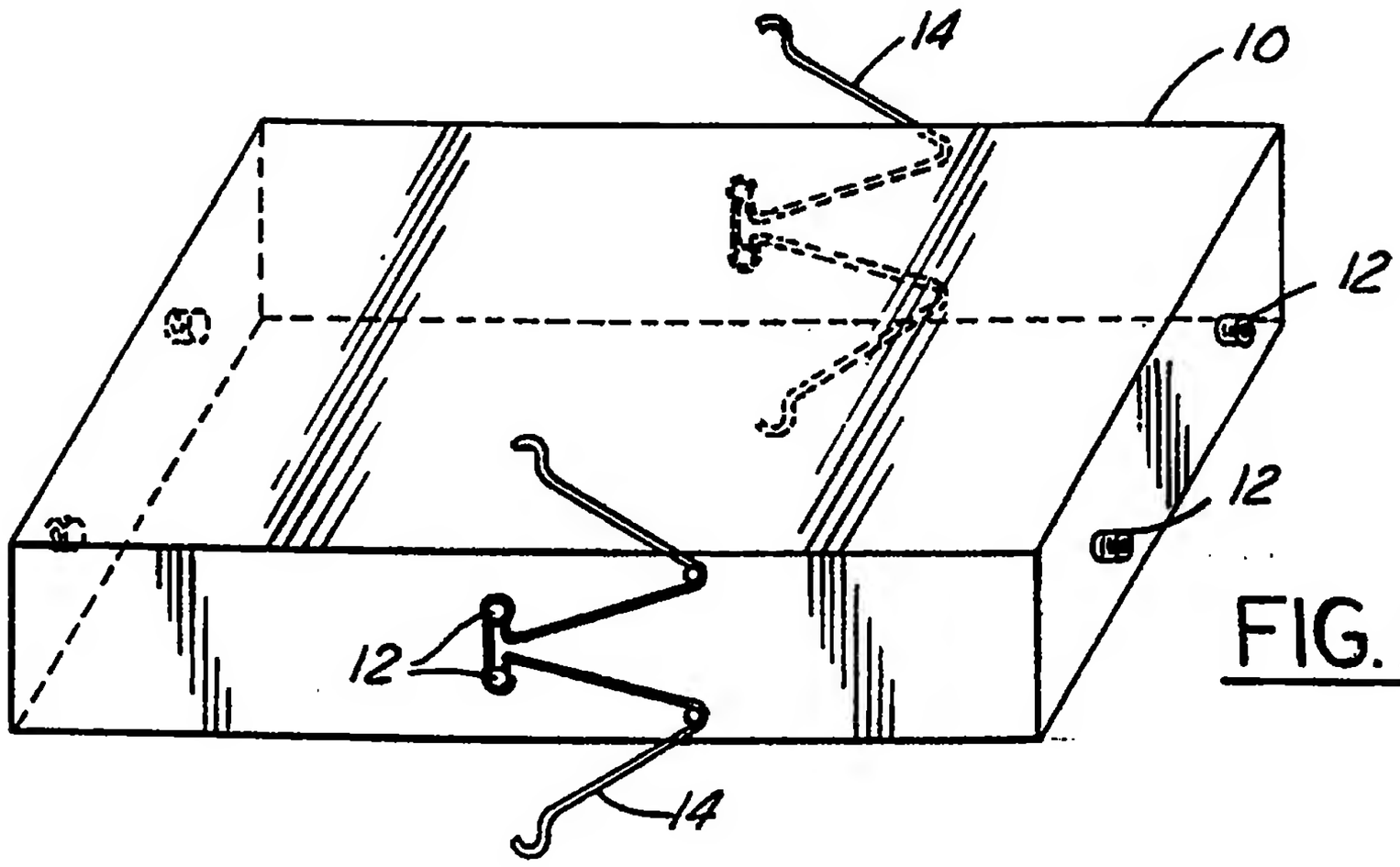

FIG. 1

FIG. 2

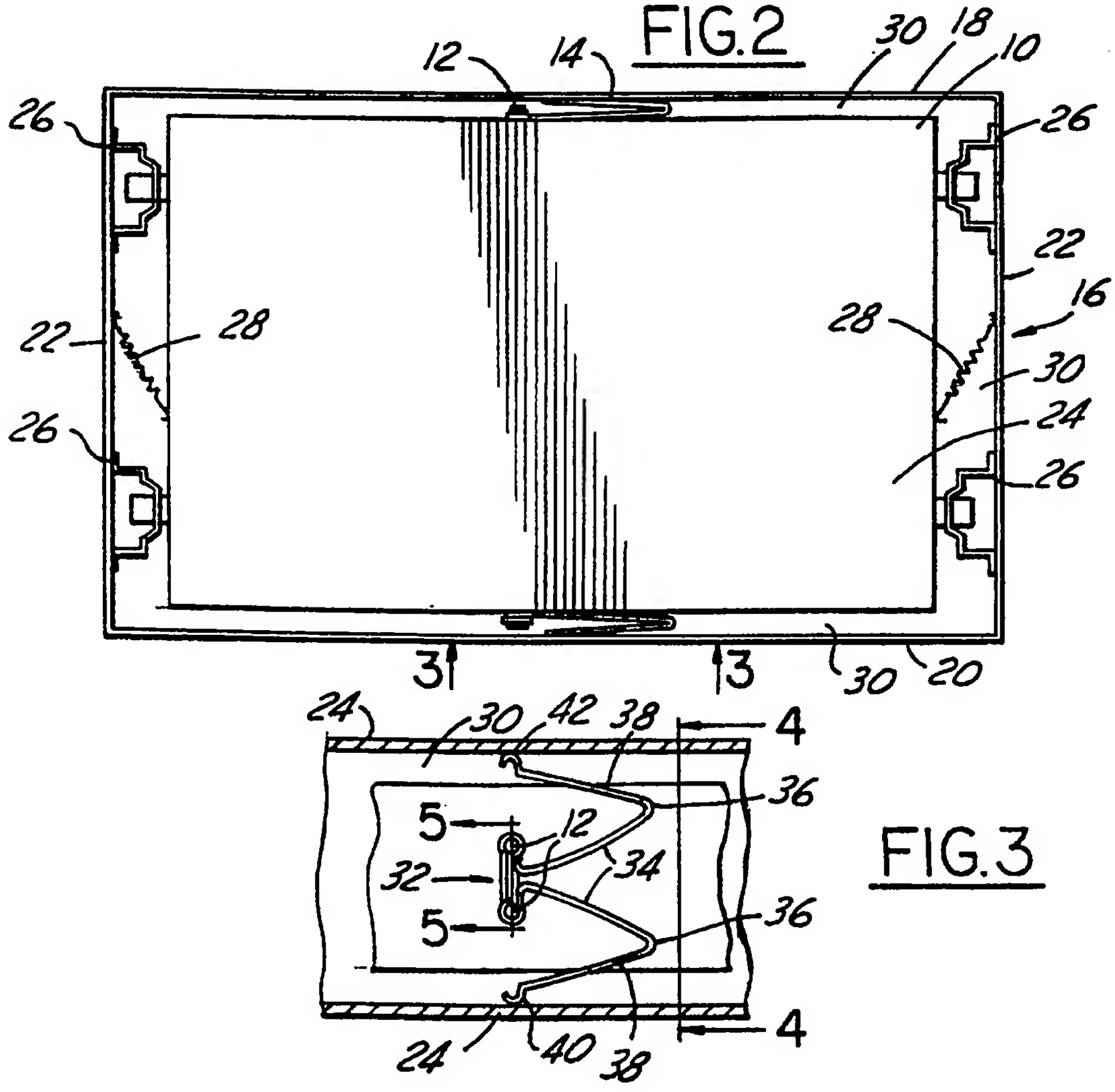

FIG. 3

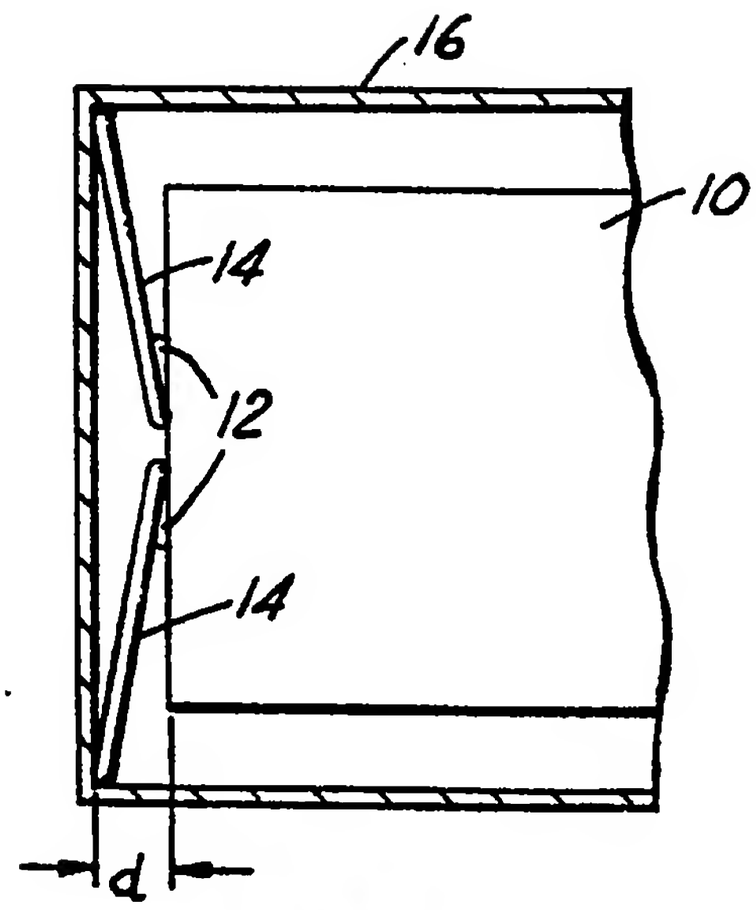

FIG.4

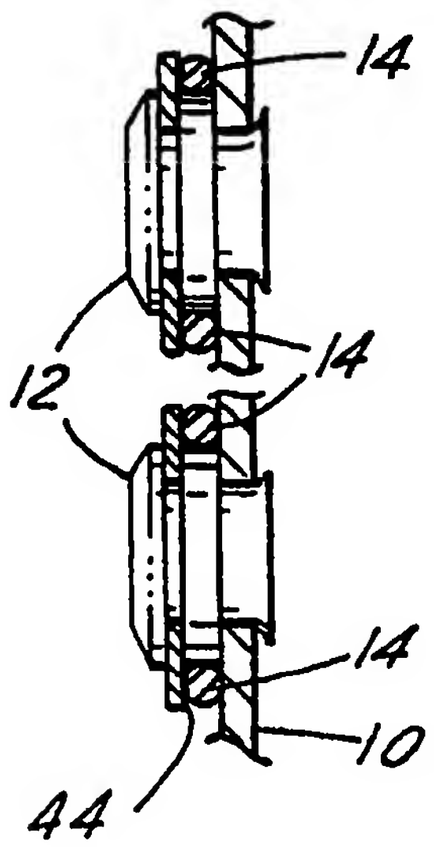

FIG.5